



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

D412-664-403
Job Sheet 173470



Part No: D412-664-403

Job Qty: 1 ea

Part Name: 412 Stainless Steel Aft Crosstubes - High



Part Weight: 0 lbs

Status: Scheduled

Priority: Medium

Job Created: 3/2/18

Job Tracking No:

Due Date: 3/23/18

Created By: Michelle Gagnon-Donovan

Type: Stock

Description:

Note: D412-664-443 REV.B/ IIN-D212-664 REV.I IPP REV:A 13.10.25 NEW ISSUE DD VERF:JLM IPP Rev.B
17.06.26 As per Dwg/Chg/PAR16-545 DP Verify DD

Ship Via:

Bill of Materials



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
CANADA
TEL.: 1 613 632-5200
Email: sales@dartaero.com
www.dartaerospace.com

Container No: S053523



Part: D412-664-403

Job No: 173470

Serial No/Batch: S053523

Revision: B/I

Inspector:

Date: 03/21/18

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea	3/19/18	3/19/18	0.00	0.00	Start Up Crosstubes-2		DP2
110	CNC Bend Crosstubes	1 pcs	3/19/18	3/19/18	0.00	5.88	CNC Bend Crosstube		DP2
127	QC	1 pcs	3/19/18	3/19/18	0.00	0.00	QC15		5/18/3/21
128	Crosstubes	1 pcs	3/19/18	3/19/18	0.00	2.78	Crosstubes-2		GP
130	Crosstubes	1 pcs	3/20/18	3/20/18	0.00	2.78	Crosstubes-2		GP
140	QC	1 pcs	3/20/18	3/20/18	0.00	0.00	QC6		
174	Outsource	1 pcs	3/22/18	3/22/18			SKY002-VC	394353	CX18/03/29 AT 18/03/2
176	Packaging	1 pcs	3/22/18	3/22/18	0.00	0.00	Packaging2		AT 18/03/21
178	QC	1 pcs	3/22/18	3/22/18	0.00	0.00	QC5		38
180	SprayPaint	1 pcs	3/22/18	3/22/18	0.00	2.70	Spray Paint		JMD 30/05/2018
190	QC	1 pcs	3/22/18	3/22/18	0.00	0.00	QC14		AG MAY 02 2018
200	Crosstubes	1 pcs	3/23/18	3/23/18	0.00	2.78	Crosstubes-2		JMD 30/05/2018
210	QC	1 pcs	3/23/18	3/23/18	0.00	0.00	QC5		215
220	Packaging	1 pcs	3/23/18	3/23/18	0.00	0.00	Packaging1-4		JUN 04 2018
230	QC	1 pcs	3/23/18	3/23/18	0.00	0.00	QC4		JUN 05 2018
235	DC	1 pcs	3/23/18	3/23/18	0.00	0.00	DC		
240	Packaging	1 pcs	3/23/18	3/23/18	0.00	0.00	Packaging3-2		JUN 05 2018
250	QC21-FG	1 Ea	3/23/18	3/23/18	0.00	0.00	QC21		21 JUN 21 2018

Part Op 110 - Bend tube as per Dwg D412-664-443 using CNC bender program D412-664-443 ****USE (4) D412-664-443 SHIM BLOC

Descriptions: TO CHECK STRAIGHTNESS****

127 - ***MARK CUT LINES***

128 - CUT TUBE AT HEIGHT ON FAI SHEET VERF HEIGHT 24.375 BY QC 15 LEVEL INSPECTOR

VERF TWIST 0.046 BY QC15 LEVEL INSPECTOR EB

130 - 1- Drill Tube as per Dwg D412-664-443 Using DT8550/8551 Drill Jigs, Set-up drill table as per QSI 010 2 -Deburr 3- Engrave Part # and Batch # as per Dwg D412-664-443 4-Remove all marks from tube within limits of D412-664-443 DWG.

180 - ***USE AXALTA 230S PRE-TREATMENT AS PER QSI005*** AXALTA BATCH: M138021 *** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE*** **VERIFY BY M138021 BATCH # TO MATCH W/O

M138021 ***VERIFY BY M138021 PART # TO MATCH W/O ***MASK SCRIBE B# & P# AND VERIFY*** 1-Prime inside & outside cross tube as per QSI 005 4.2 BATCH: M138021 2- Apply matte clear coat to underside of cross tube per QSI005 4.2 BATCH: 138032 3- MASK UNDERSIDE OF CROSSTUBE AS SHOWN ON DWG BEFORE PAINTING 4 -Paint Outside of Tube as per Dart QSI 005 4.2 BATCH: 138019 5-Remove masking

200 - 1- *****LAY DOWN CORSTUBE ON TABLE AND PUT DT10302 PINS IN SADDLE HOLE FACING UP, USE HOLE IN TAPE MESURE TO PUT IN PINS FOR LOCATING CENTER OF CROSSTUBE. ***** Install center support using scotch-weld DP460 per QSI 015, as per DWG. note 12. Install supports clamps as per Dwg D412-644-443. . ***ENSURE CLAMPS ARE ON TOP OF CROSSTUBE SUPPORT*** Torque clamps on support to 80-100 IN-LBS AS PER DWG. A/R scotch-weld DP460 BATCH # M137679 EXP DATE: 06/18 2- **IF NOT ALREADY PRESENT ON CHAFFING SHEILD.** Apply a thin coat of proseal 890 per QSI 015 on inside concave surface of chaffing shield and let cure per manufacturer's instructions. Install prosealed chaffing shield onto crosstube by applying a thin coat of proseal 890 onto crosstube. Be sure to eliminate any air gaps. Install and torque clamps on chaffing shield to 40-50 IN-LBS AS PER DWG. A/R Proseal 890 Batch: 138784 EXP DATE: 09/18 AFTER FINISH CURE TIME 24H START CURE TIME: 30/05/2018 FINISH CURE TIME: 31/05/2018 PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER CURED FOR 24H.

210 - PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER CURED FOR 24H.

235 - Photocopy bluefile & type labels per PPPD412-664-403 CHG002

240 - Identify and pack for shipping as per PPPD412-664-443 Location: _____ PPP Rev: _____

Job BOM

Part / Item	Component Name	Quantity	Operation	Container
D412-664-443TRN	Crosstube Turning Detail	1 Ea (1 ea)	90-Start up Operation	
D4910-1 <u>2040132</u>	Chaffing Shield	2 Ea (2 ea)	200-Crosstubes	
MS21920-26	Clamp	4 Ea (4 ea)	200-Crosstubes	
D5380-1 <u>2046132</u>	Support	1 Ea (1 ea)	200-Crosstubes	
D5380-3	Support Base	1 Ea (1 ea)	200-Crosstubes	
NAS1805-4P	Nut	8 pcs (8 ea)	200-Crosstubes	
NAS6704-21	Bolt	8 pcs (8 ea)	200-Crosstubes	
AN6-40A	3/8-24 Bolt X 3" Long	4 Ea (4 ea)	220-Packaging	<u>5041108</u>
AN6-41A	Bolt	2 Ea (2 ea)	220-Packaging	<u>5045844</u>
MS21042L6	Nut	6 Ea (6 ea)	220-Packaging	<u>5041108</u>
NAS1149D0663J	Washer	18 Ea (18 ea)	220-Packaging	<u>5043782</u>

Job Allocations				
Operation	Component Part	Required	Inventory	Allocated
90-Start up Operation	D412-664-443TRN	1	4	0
200-Crosstubes	D4910-1 <i>5047610</i>	②	8	0
	D5380-1 <i>5071133</i>	①	5	0
	D5380-3 <i>5069774</i>	①	5	0
	MS21920-26 <i>5048811</i>	④	10	0
	NAS1805-4P <i>5043784</i>	④	108	0
	NAS6704-21 <i>5043791</i>	⑧	104	0
220-Packaging	AN6-40A	4	156	0
	AN6-41A	2	91	0
	MS21042L6	6	536	0
	NAS1149D0663J	18	1,740	0
Part Specifications				
Specifications could not be found.				

Plex 3/2/18 9:42 AM Dart.Gagnon.Michelle

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SUBJECT TO AMENDMENT

WITHOUT NOTICE
WORK ORDER
NO. 173470 *md*

MAR 02 2018

Item	Qty	Part Number	Description
	443		
1	X	D412-664-443	CROSSTUBE ASSEMBLY (412 HI AFT)
2	1	D6020-132	CROSSTUBE MATERIAL
3	2	D4910-1	CHAFING SHIELD
4	1	D5380-1	SUPPORT
5	1	D5380-3	SUPPORT BASE
6	4	MS21920-26	CLAMP
7	8	NAS1805-4P	NUT
8	8	NAS6704-21	BOLT
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890 OR 1422	SEALANT

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6020-132
FINISHED LENGTH = 130.10±0.060 (BEFORE BENDING/TRIMMING)
- FINISH: PREPARE TUBE PER QSI 005 SECTION 4.1.4
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
APPLY MATTE CLEAR COAT TO UNDERSIDE OF CROSSTUBE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING
- TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART P/N 'D412-664-443' AND B/N ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 67.8 lb FINISHED WEIGHT
- PART IS SYMMETRIC ABOUT CENTERLINE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R35 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

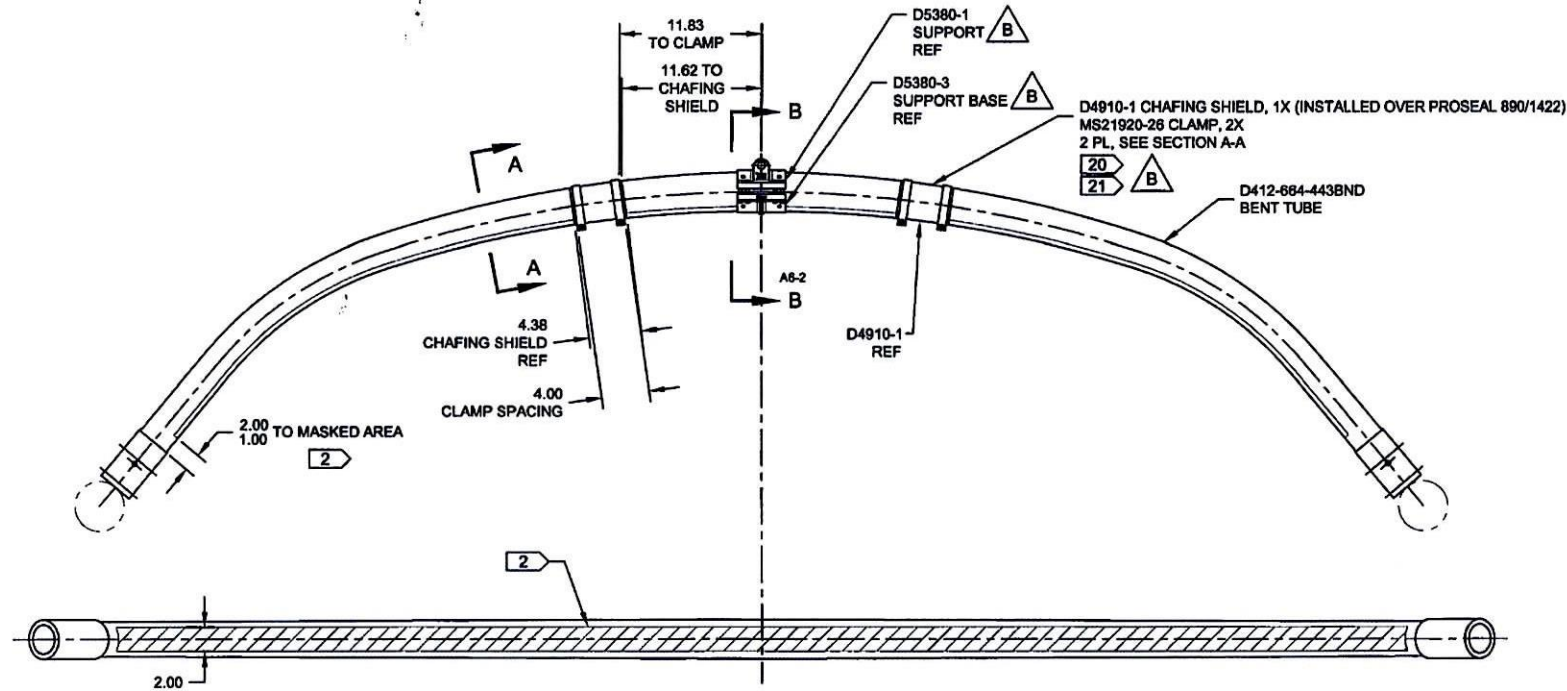
ASSEMBLY

- LOCATE THE D5380-1/3 SUPPORTS ONTO THE CROSSTUBE AS SHOWN IN THE ASSEMBLY DETAIL.
- ABRADE THE MATING SURFACES OF THE CROSSTUBE AND D5380-1/3 SUPPORT HALVES WITH 180-GRIT SANDPAPER. SATURATE A CLEAN CLOTH WITH MEK, 4105S WASH'N'WIPE DEGREASER OR EQUIVALENT AND WIPE CLEAN UNTIL THERE IS NO RESIDUE.
- APPLY A 0.04" TO 0.07" THICK LAYER OF 3M DP460 ADHESIVE ONTO THE CONCAVE SURFACE OF THE D5380-1 SUPPORT AND THE D5380-3 SUPPORT BASE.
- INSTALL D5380-1 SUPPORT ONTO THE CROSSTUBE AS SHOWN IN THE ASSEMBLY DETAIL AND INSTALL QTY (2) NAS6704-21 BOLTS INTO OPPOSING CORNERS OF THE D5380-1 SUPPORT. ALIGN THE BOLTS WITH THE HOLES ON D5380-3 SUPPORT BASE AND INSTALL ONTO THE CROSSTUBE.
- INSTALL THE REMAINING QTY (6) NAS6704-21 BOLTS AND QTY (8) NAS1805-4P NUTS, THEN EVENLY TORQUE THE NUTS IN A CRISS-CROSS PATTERN TO 60-70 IN-LBS. ENSURE A MINIMUM OF 1.5 THREADS ARE IN SAFETY.
- WIPE OFF EXCESS ADHESIVE USING A CLEAN CLOTH SATURATED WITH MEK, 4105S WASH'N'WIPE DEGREASER OR EQUIVALENT
- ALLOW DP460 ADHESIVE TO CURE FOR 24 HOURS.
- FILLET SEAL THE EDGES OF THE D5380-1/3 SUPPORT HALVES WITH PROSEAL PR1422 B1/2 OR PR890 B1/2 ALLOW PROSEAL TO CURE FOR 24 HOURS.
- IF NOT ALREADY PRESENT ON D4910-1 CHAFING SHIELD, APPLY A 0.015" TO 0.020" THICK COAT OF PROSEAL 890/1422 ON INSIDE CONCAVE SURFACE OF D4910-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS.
- RECOAT THE D4910-1 CHAFING SHIELD WITH 0.015"-0.020" OF PROSEAL 890/1422 AND IMMEDIATELY INSTALL ONTO THE CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS. ENSURE THE D4910-1 CHAFING SHIELDS ARE WRAPPED TIGHTLY.
- TORQUE CLAMPS ON D4910-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON MS21920-26 CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

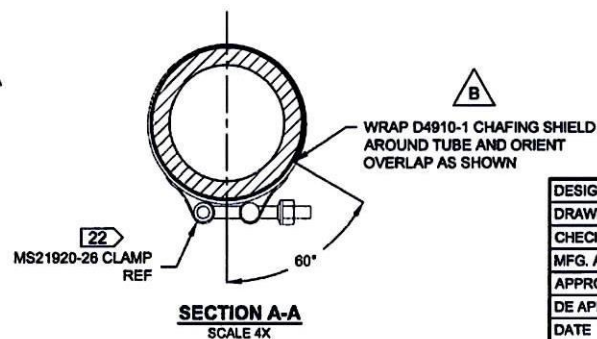
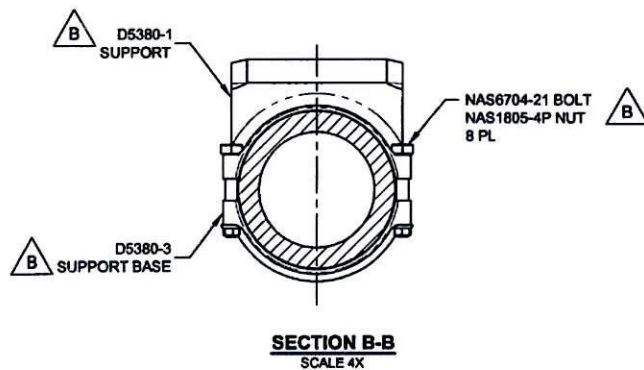
RELEASED

2017 JUN 21
ECN17-593 *q*

B	ADD ITEMS 4, 5, 7, AND 8. DELETED ITEMS D4909-1, MS21920-26 & D3595-063-530. NOTE 2 UPDATED FOR TUBE FINISH. ALL ASSEMBLY NOTES REWRITTEN. SHEET 2 SECTION A-A ANGLE DIM ADDED FOR CHAFING SHIELD INSTALLATION. ASSEMBLY DETAIL AND SECTION B-B UPDATED FOR INSTALLATION OF D5380-1/3.	AJS	16.11.03
A	NEW ISSUE	CP	14.04.01
REV.	DESCRIPTION	BY	DATE
DESIGN	CP	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	AJS	DRAWING NO.	REV. B
CHECKED	<i>MD</i>	D412-664-443	SHEET 1 OF 4
MFG. APPR.	<i>MD</i>	TITLE	SCALE
APPROVED	<i>MD</i>	CROSSTUBE ASSY (412 HI AFT)	NTS
DE APPR.	<i>MD</i>	COPYRIGHT © 2013 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	
DATE	16.11.03		

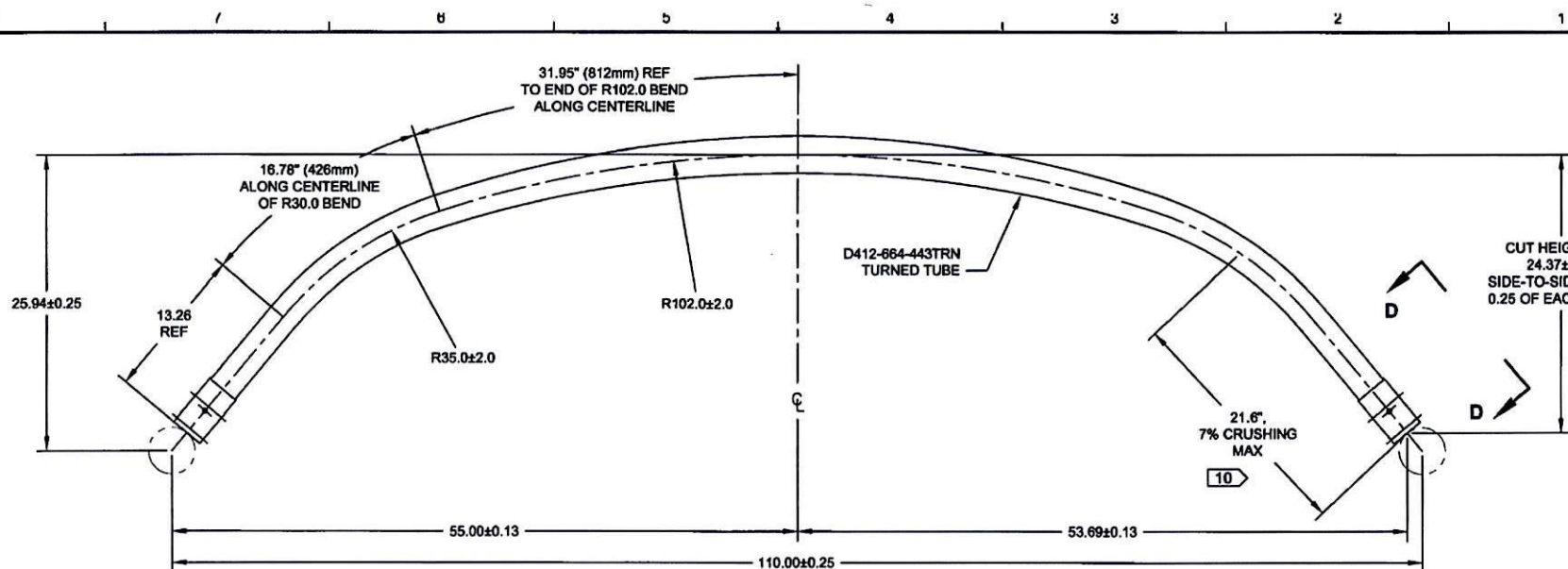


SYM
D412-664-443
ASSEMBLY DETAIL

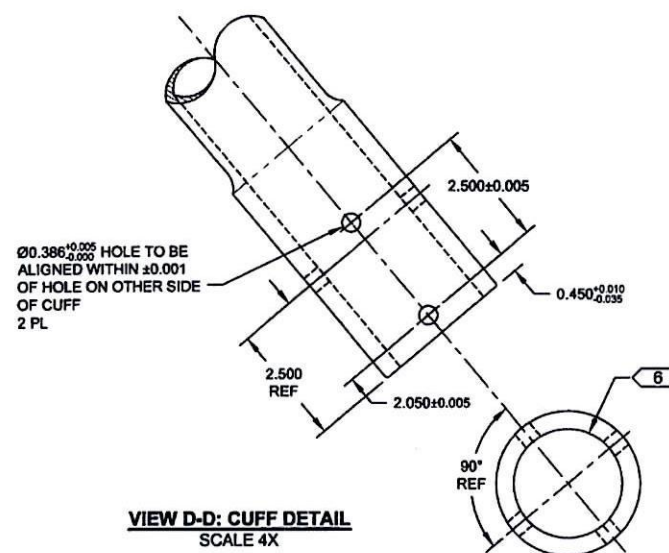


RELEASED
2017 JUN 21 41

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DRAWN	AJS	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>[Signature]</i>	DRAWING NO.	REV. B
MFG. APPR.	<i>[Signature]</i>	D412-664-443	SHEET 2 OF 4
APPROVED	<i>[Signature]</i>	TITLE	SCALE
DE APPR.	<i>[Signature]</i>	CROSSTUBE ASSY (412 HI AFT)	NTS
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D412-664-443BND
BENDING DETAIL

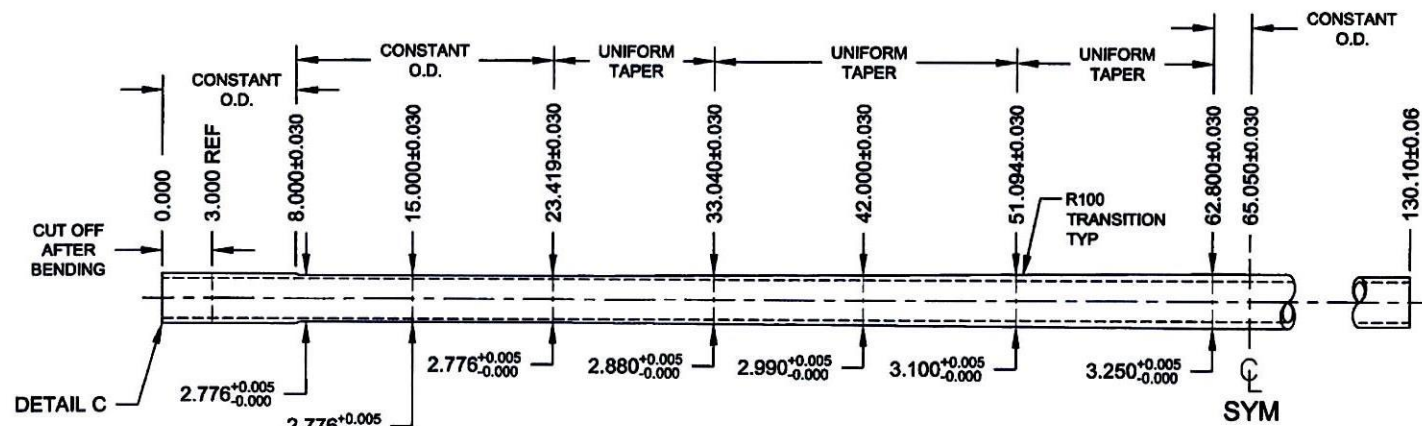


VIEW D-D: CUFF DETAIL
SCALE 4X

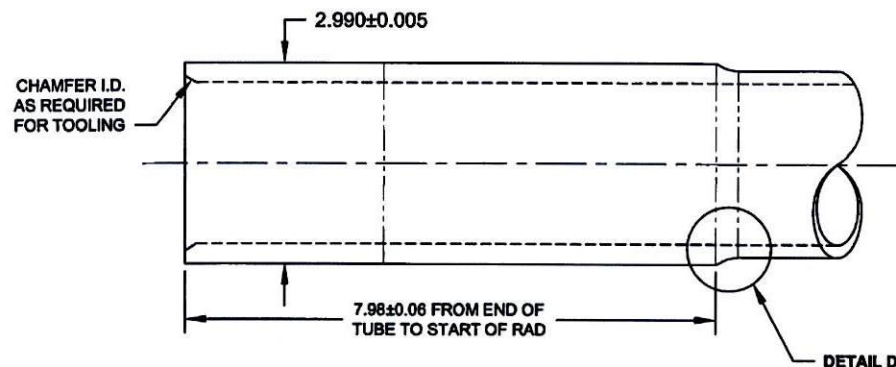
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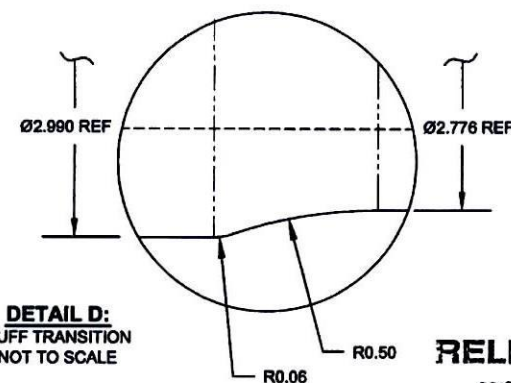
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DRAWN	AJS	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>[Signature]</i>	DRAWING NO.	REV. B
MFG. APPR.	<i>[Signature]</i>	D412-664-443	SHEET 3 OF 4
APPROVED	<i>[Signature]</i>	TITLE	SCALE
DE APPR.	<i>[Signature]</i>	CROSSTUBE ASSY (412 HI AFT)	NTS
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D412-664-443TRN
TURNING DETAIL



DETAIL C:
CUFF TRANSITION
SCALE 4X



DETAIL D:
CUFF TRANSITION
NOT TO SCALE

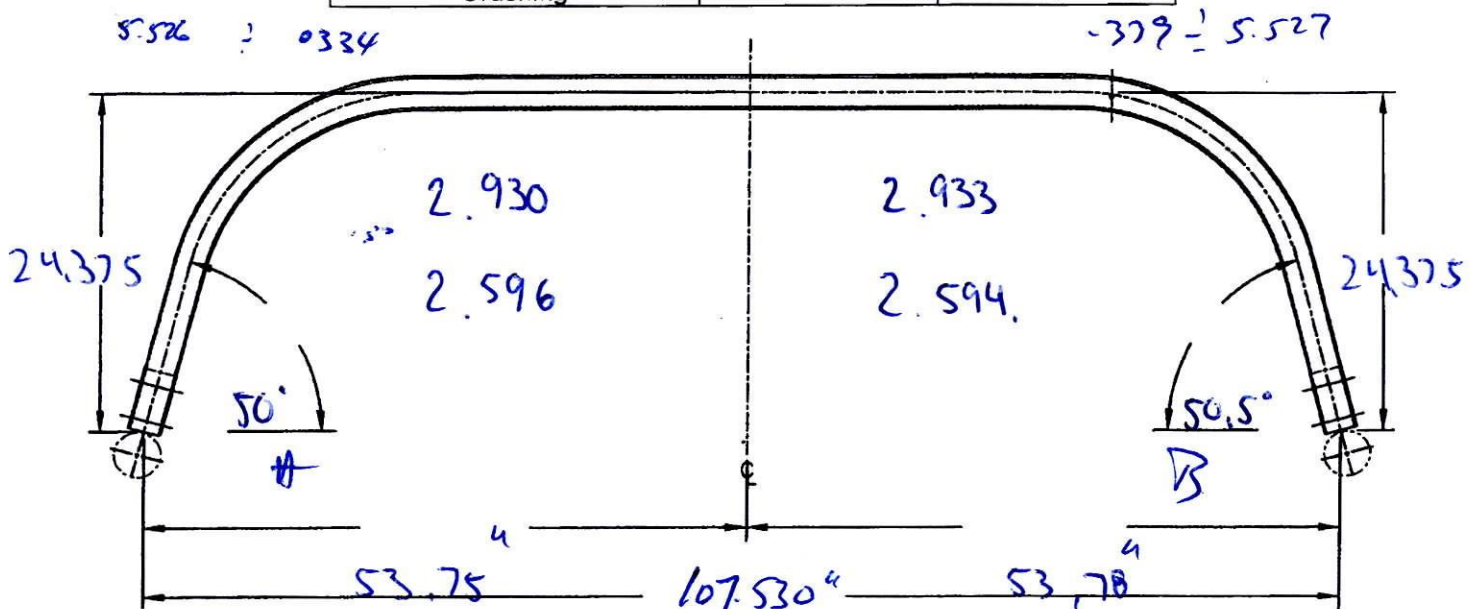
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2017 JUN 21 17

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DRAWN	AJS		
CHECKED	<i>[Signature]</i>	DRAWING NO.	REV. B
MFG. APPR.	<i>[Signature]</i>	D412-664-443	SHEET 4 OF 4
APPROVED	<i>[Signature]</i>	TITLE	SCALE
DE APPR.	<i>[Signature]</i>	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
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DART AEROSPACE LTD		Work Order:	173470
Description: Crosstube High Aft (412)		Part Number:	D412-664-403
Inspection Dwg: D412-664-443 Rev: A		Page 1 of 1	

Required Dimension	Min	Max
Height	24.12	24.62
1/2 Span	53.56	53.82
Angle	49°	52°
Total Span	107.12	107.64
Bending Passes	8	--
Crushing	--	7%



	Side A	Side B
Bending Passes	6/6	6/6
Crushing		
Comments		

QC15 Inspection	5
Date	2018/03/21

Rev	Date	Change	Revised by	Approved
A	14.07.08	New Issue	KJ	UP



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

PURCHASE ORDER **PO039435**

Supplier: SKY002-VC
Skyservice
6120 Midfield Road
Mississauga
ON
L5P 1B1 Canada
Phone: 905-678-5636
Fax: 905-678-5841

PO No: PO039435

PO Date: 3/27/18

Due Date: 3/29/18

Purchase Order

Revision:

Revision Date:

Ship-To Contact: Lavoie, Chantal
Phone: clavoie@dartaero.com

E-MAILED

MAR 29 2018

Ship To: 1270 Aberdeen Street
Hawkesbury
ON
K6A 1K7 Canada
Phone: 613-632-5200

Via: Ground

Pymt Terms: Net 30

Freight Terms:

Special Comments:

Items

Line Item	Job	Part	Description	Status	Due Date	Order Quantity	Received Quantity	Balance	Unit Price (CAD)	Extended Price
1	173469	D412-664-403	412 Stainless Steel Aft Crosstubes - High	Firmed	3/29/18	1 pcs	0 pcs	1 pcs	\$208.75/pcs	\$208.75
	173468			Firmed	3/29/18	1 pcs	0 pcs	1 pcs	\$208.75/pcs	\$208.75
	173467			Firmed	3/29/18	1 pcs	0 pcs	1 pcs	\$208.75/pcs	\$208.75
	173470			Firmed	3/29/18	1 pcs	0 pcs	1 pcs	\$208.75/pcs	\$208.75
Sub Total:						4	0	4		\$835.00

Grand Total: \$835.00

Order Notes

Procurement Quality Clauses
A005 right of entry
A012 chemical and physical test report
A016 personnel qualification
A017 raw material identification (as applicable)

A022 Apical Processing
A024 process certifications
A026 certification of material conformance

A041 quality management system
A042 dart notification by supplier
A043 retention of quality documents

A048 counterfeit parts avoidance, detection, mitigation and disposition program

A049 supplier awareness

Terms & Condition of Purchasing(Suppliers) and Procurement Quality Clauses are an integral part of our AS9100 requirements. To learn in detail, please visit www.dartaerospace.com for further explanation.

Plex 3/29/18 12:43 PM dart.lavoie.chantal

5.2 HIGH GEAR CROSSTUBE, HEAVY-DUTY

ITEM	QTY -403	PART NUMBER	DESCRIPTION
	X	D412-664-403	CROSSTUBE INSTALLATION, HEAVY-DUTY, 412 HIGH AFT
9	1	D412-664-443	CROSSTUBE ASSEMBLY, HEAVY-DUTY, 412 HIGH AFT
71	2	* D4910-1	CHAFING SHIELD
73	4	* MS21920-26	CLAMP
75	4	AN6-40A	BOLT
76	2	AN6-41A	BOLT
77	6	MS21042L6	NUT (OR MS21042-6)
78	18	AN960JD616	WASHER
81	1	* D5380-1	UPPER SUPPORT HALF
82	1	* D5380-3	LOWER SUPPORT HALF
83	8	* NAS1805-4P	NUT
84	8	* NAS6704-21	BOLT

*REFERENCE ONLY. PARTS ARE INCLUDED IN D412-664-443 ASSEMBLY ABOVE

NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AAI SKIDTUBES.

DAS
6
9-89

JUN 05 2018